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EDITED TRANSCRIPT

ADI.OQ - Analog Devices Inc at Sanford C Bernstein Strategic Decisions Conference (Virtual)

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PRESENTATION

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Good afternoon, everyone. Thank you for joining us today. I'm Stacy Rasgon. I cover the U.S. semiconductor and semiconductor capital equipment space here at Bernstein. Today, it's my great honor to introduce our guest, the President and CEO of Analog Devices, Mr. Vincent Roche.

Before we begin, I want to mention if you have -- we'll have about 50 minutes for our Q&A today. If you have questions that you'd like to ask during the presentation, you should have a link to the Pigeonhole Forum where you can submit those questions on your screen, and we'll have time for that kind of Q&A again.

Now what is ADI. ADI is known as an extremely high-quality franchise in the amyloid space, particularly as it relates to signal conversion and processing. And so they've embarked on a rationalization program of their product portfolio and manufacturing footprint.

They did a lot, they were smart enough to exit mobile early enough to actually get paid to do it, they're one of the few. They've increasingly focused their product offerings since then on high-value applications, whatever the end market as well as greatly increasing their presence in new markets, automotive, health care.

They took early steps before many of their peers to shutter unnecessary capacity in the last cycle, and they seem to be handling things pretty well on this one. Their acquisition of Linear Technology was a -- it was the premium high-performance analog player in the industry, it's further extended their transformation, bringing a power management franchise into strong synergy with their classic signal chain offerings, brings their margin structures as well to new heights. And they're about to close on another acquisition of Maxim Integrated, which should further cement the story, especially in automotive and other application-specific areas as well as enable significantly and more aggressive capital return given the structure of the deal.

So the company comes up a lot in my conversations. I've seen a lot of the conversations include beyond the near term, of course, the impending Maxim deal but also the sustainability of the growth profile, especially in a post-COVID shortage plague world, an emerging EV story around battery management, an overall growth narrative that it seems like it's more industrial versus comm driven in the past. I don't think that's such a bad thing. We can talk about that. And of course, the broader question of the geopolitical environment as well.

And the answer to these, and hopefully, many other questions, it gives me great pleasure to introduce some Mr. Vincent Roche. Vince, thank you so much for being with us here today. Really appreciate it.

Vincent T. Roche - *Analog Devices, Inc. - President, CEO & Director*

Stacy, thanks for having me and for that great introduction. Thank you.

QUESTIONS AND ANSWERS

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

You bet. In this format, I do like to try to stay away from the short term, but I don't think we can avoid it. I want to get it off as quickly as we can. But I do want to start out with the current shortage situation. It's fairly impressed. I mean, I've been working -- doing this job for over a dozen years. I've never seen anything that came quite close. You've been working in this industry quite a bit longer than I have.

Just curious what you're seeing in terms of the situation. Are you seeing anything different by end market or broad-based, your own internal and external constraints, where are you seeing pressure and where are you seeing more cushion? And what actions are you taking right now to address it?

Vincent T. Roche - *Analog Devices, Inc. - President, CEO & Director*

Yes. So good question, Stacy. Thank you for the many questions. The -- I'd say, first and foremost, what is unprecedented in this cycle is the number of secular trends that are driving the industry from Industry 4.0. And the pandemic, if anything, has shown us the fragility of the global supply chain. And we're going to use more automation, clearly to reshore, onshore and try to solve for some of the fragility. We're seeing digital healthcare, take a real boost as a result of the pandemic, but the process of digitalization has been slow, but at least it's been moving in healthcare, but it's certainly accelerating now.

We're seeing more and more sophisticated communications. We've got 5G. We've got O-RAN coming. Silicon and software are the new value creation engines of automobiles. You mentioned EVs coming, that will be a transformative modality in the whole world of automotive. And we're using more and more gadgets. So consumer has had a great cycle through the pandemic, and it looks like it will continue.

So we came into -- so we've got all these concurrent drivers of the industry and of ADI. If I look at kind of 2018, 2019, we were all petrified of a recession, we got a recession, but the cause was completely out of the blue. But right now, what we're seeing is in the first half of '20, we saw a huge uptick in demand for our consumer goods, gaming, advanced communication systems and healthcare. And I think those needs have continued. I mean, that demand has continued. And then in the latter half of '20, as we began to think about rebuilding supply chains and how to deal with the huge shift to online retail and what that means in terms of automation, process automation and so on, so forth. That, to me, is a multiyear cycle that will continue. So all these things have driven demand. And we're chasing supply. And my sense is we'll be chasing supply in the industry for at least another year before we get any kind of you -- I mean the choke point today is largely in the silicon fabrication side of things. And I think as long as the demand continues, we'll be chasing supply. And I think that will be for at least another year to 1.5 years from now.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Got it. I got the impression on the earnings call that your internal silicon fabrication was not necessarily the bottleneck. Is it actually more kind of foundry and back end? Or is it like across -- where are you actually seeing like some of the constraints right now?

Vincent T. Roche - *Analog Devices, Inc. - President, CEO & Director*

Yes. I'd say today, most of the constraint that we're seeing is in terms of external third-party silicon procurement. Our back end, we got ahead of this cycle, and we've been putting a lot of capacity into our test facilities to make sure that outgoing test is well covered. And we still have some redundancy built in there. So yes, at this point, Stacy, I would say the biggest choke point for ADI is external silicon third-party supply.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Got it. Is that just a function of their just -- the industry hasn't really added a ton of like more mature node capacity over time? Do you think that they need to now?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. I think there's no doubt about that, that we're seeing nodes like 40 millimeters, 0.18. I mean, one of the great facets of the analog industry is the sheer number of recipes that we use. There are specific choke points within, 40 nanometers happens to be an important node in the consumer business and in areas like automotive. So that's one particular area. But we're -- there is more capacity coming on bit by bit. And I would say our particular supply situation has been improving bit by bit as well over the last several months.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. I'm going to ask one more short term and then we'll move on to maybe more interesting stuff. But you talked about like as long as the demand holds up, then we'll likely be supply-constrained like into next year or this for another year. How confident are you about the quality of the demand that we're seeing right now? Are you able to parse it?

Obviously, everybody is worried about double orders, and they always would in this kind of a situation, but would you have any visibility into the quality of the demand that you're seeing? And I guess are you fulfilling whatever is coming in? Are you trying to sort of like parse out or try to control like the nature of the orders that are coming in?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. Really good question. So I think, first and foremost, nobody is building inventory right now. I mean, automotive companies were shutting inventory in 2019 into 2020, but also our industrial customers have kept their inventories very, very lean over the same period of time. So right now, I think what we're doing is, I mean, GDP is storming. And with GDP goes the industrial infrastructure segment. So my sense is, what we're seeing now is real demand, and we, as a company, use POS as our demand signals. So we use sell-through rather than sell-in as the planning signal, if you like, for our capacity, for our -- laying in our manufacturing plans. And we're paying very, very close attention to what the POS signals are telling us by sector. And if we do see anything out of kilter, we'll balance it and make sure that we've got supply in the places where the POS signals tell us the supply should be.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Okay. Let's move on to more interesting stuff. I want to start with some of the end markets. Obviously, industrial is your biggest segment. And again, I sort of got the impression a quarter or 2 ago that the nature of the growth -- or the growth story was changing a little bit. I mean you built -- and we'll talk about common a bit, but you had built a growth narrative around comm, and it really seemed to be shifting a little more toward industrial.

I guess to start out, could you maybe talk us through a little bit about what industrial is for you? I mean, obviously, it's -- I always think about it as hundreds of end markets and thousands of products and tens of thousands of customers, but maybe a little more detail, which products or end markets within industrial are you most excited about, whether it's growth prospects or content increase or anything else? What are the key areas within that large business segment that you think investors really ought to be keeping their eyes on?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So first and foremost, the industrial sector is around half of the company's total business. And the sectors within that are factory and process automation, aerospace and defense, healthcare and what we call instrumentation, which is a mix of automatic test equipment, electronic test and measurement and scientific instrumentation.

So there's many tens of thousands of customers across those 4 giant applications. Aerospace and defense is a little more concentrated, but all the others are highly diverse. So we supply tens of thousands of product SKUs to tens of thousands of customers across the globe with product life cycles that tend to be anywhere between 15 and 35 years. So it's a very, very durable, diverse franchise.

When I think of factory automation, that, to me, is today about moving more and more digital technologies into these machines, connecting these machines, building more sensing on board. It's otherwise what people would call Industry 4.0. So it's using more and more automation routines in our -- in the automotive plants, in the pharmaceutical plants, et cetera, et cetera. These machines are becoming ever more instrumented and ever more sense. So that's a good place for ADI.

Aerospace and defense, we largely rekindled our interest in that business when we acquired Hittite several years ago, 6 or 7 years ago. Roughly, I think, 40% of Hittite's business, which is microwave and RF, was centered in the aerospace and defense area. And as we know, there is more and more satellites being deployed. There's more and more automation being used in the defense sector. And all that is good for ADI, more connectivity, more sensing. The healthcare sector has been growing. It's a \$400 million plus business for ADI.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

That's how big it is now? Okay.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes, it's well over \$400 million these days. But growing about 10% a year for the last several years, and I expect that kind of growth pattern to continue for several years to come. And the instrumentation business has been driven by -- during the pandemic, it was the instrumentation used to test memory systems for cloud, advanced communication systems for interconnectivity and data centers, for 5G buildouts and so on and so forth.

So it's all those applications combined in that multi-customer, multi-market, multi-product franchise. So that's a summary of industrial. And my sense is we should be able to grow that business over the next several years at kind of 5% compounded, I believe. And we are now connecting the LTE power franchise as well to more of the sockets in the industrial area plus the other sectors that we're focused on. So that's another tailwind from a product perspective.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. How do you sort of parse out that 5%? How do you think about like overall GDP market growth versus share gains versus content increase?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So we've always said that if GDP grows at 2.5%, the business share will grow 5%, but my sense is GDP will be somewhat better than that, at least through the full of 2022, probably into 2023. But I think also, we've been putting up share gains in the industrial area. So I think we can always depend on some multiple of GDP, and then perhaps a couple of points of growth through market share gain and connecting the LT portfolio and the Maxim portfolio when we get it on board.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

I don't know. In that context, 5% feels kind of conservative to me.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Look, I hope you're right. I think when we plan, we plan our investments. If we can get 5% compounded on half our business for the next 10 years, I think that's a pretty good result.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Okay. So you're thinking that kind of a timeframe, by the way, like it's not like a 2-year target or anything like that, this is like a long compounding kind of thing?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

It's a long-term target. In your prepared remarks, you talked about ADI is refocusing the investment portfolio about a decade ago in the B2B space, but the first call on R&D for ADI is the industrial market. So we have a great set of on-hand products and to make up a large portion of the opportunity pipeline, but with a lot of new stuff coming as well in sensing, connectivity, signal processing power. And they continue to add more momentum to the portfolio.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Got it. Now what about comm? Like I know you had talked about -- I think when you were here last year, you talked about comm as sort of like a long-term double-digit grower. I know you sort of like took that down a little bit 3 months ago, just because of Huawei and like the current situation that's kind of going on in China. How do we think about like the long-term prospects for the comm business, especially given the 5G rollout, I guess, taking into account some of the changes in the nature of the customer base, given the China situation and all of that.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So let me try and unpack a little bit, Stacy. So today, our communications business is about \$1 billion, and 40% of that \$1 billion comes from what we call wireline communications. So it's things like metro, long haul, local, optical, communication systems, data centers, cloud activities, adding power management to these capabilities as well. And my sense is, I mean, that's been growing over the last few years in kind of high single digits. My sense is that is likely to continue given the opportunity pipeline we have and the new suite of products that we've got. The reason for changing the perspective on the long-term growth communications from kind of 10-ish to 7-ish is largely because of the change in the wireless business. And when I look at it today, we now view China as opportunistic to our business.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

In comms or more broadly, by the way?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Just in wireless. I would say just in comms, just in comms, more opportunistic, but the wireless business for ADI is more than 3x bigger in rest of world than China. So that's where the growth is likely to be, I think, centered in America. We've -- C-band auctions are complete now. Carriers are trying to monetize the spectrum. So my sense is we will see a multiyear build-out of 5G and O-RAN will have a position to play as well.

We've seen some very good traction with our O-RAN business or the open radio standard business in Japan through Rakuten and so on. So Europe is about to build out 5G as well. They're going to skip. It looks like a couple of generations and get seriously into 5G in the 2023 timeframe. So I think they will be the growth drivers for ADI, classical 5G sub-6 gig microwave in America. Europe is yet to come. And then we have opportunistically business in China plus the rest of Asia. So I think that's how I view the structure of the business at least geographic.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Can you talk a little bit about O-RAN, by the way? Like I know you've been talking about this a lot, but like exactly what is O-RAN? What does that word mean? And what does it mean for your business, for the folks on the line here, who may not be familiar with that?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So it's the open radio access network standard. And basically, what it is trying to achieve is, first off, an open platform that, in theory, carriers can use, classical carriers, and if you like, use the technology for their own needs, the traditional OEMs can use O-RAN, but it's a distributed radio network system that moves from kind of centralized carrier owned networks. It moves the network closer to the edge. So in theory, you get more edge processing, you get more power, where the base stations are centered. And -- but I think the key -- so there's -- the network is distributed around the radio, the distribution unit and then the central unit, but I think the key part of it is that the standards are open for anybody to get access to. And I think we'll see new entrants, particularly entrants that are maybe cloud-oriented or computing-oriented, who want to bring 5G radio type technology to private networks in areas like industrial businesses.

The big promise of 5G has always been, yes, the consumer benefits with a lot more bandwidth, a lot more channel pipeline, if you like, a broader pipeline to get more rich data streams. But the other part has always been that we get the opportunity to bring very, very high quality, deterministic communications networking to mission-critical applications like factory automation, healthcare and automotive. So that's -- I think O-RAN gives that particular part of the value proposition, the B2B proposition, a bit more impetus.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. So they'd be able to basically deploy their own like high-quality networking brings new customers into the fold, like that kind of thing?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Exactly. Exactly. New use cases, new customers and new suppliers.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. How long until it really gets going, do you think? What stage is this in?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

It's starting. I mean, the first kind of public proclamation of 5G-level private networking is -- has been in Japan with Rakuten, the online retail system there. So my sense is, we'll start to see -- we're starting to see trials now. So somewhere in 2022, I think we'll see some earnest build-out of O-RAN.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Let's talk about automotive. So I guess just tactically, especially in the wake of the current situation. Obviously, that market for a variety of reasons has been impacted worse than others. Do you still think -- like how long do you think the industry takes until it gets back into supply demand balance? And I guess, presumably, this is one of those markets where you don't think inventory is yet being built. Do you think everything you're shipping right now is going into an automobile? It feels like that for a lot of your peers.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. I think so, Stacy, I don't think -- I think automotive customers have left the build inventories. But I think it's pretty much hand to mouth now. But I will say, I mean, over the last several months, the supply line for automotive customers from our perspective has been getting -- just edging better month by month. So -- but I think we'll be chasing supply across the board and including automotive for at least another year.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Okay. And I got to say like auto was one of those areas of your business that, for us, especially post-Linear, was a little challenged from a growth perspective for a while. Can you talk a little bit about why that was and what was causing it? Is it -- what is the situation today versus, say, a few years ago?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. We had immense business that we -- that had largely commoditized and we had begun to really extract ourselves, we stopped the R&D several years ago. So that was a headwind for ADI for a period of time. So that has -- it's still a bit of a headwind, but we have significant growth drivers now, for example, in the in-cabin electronics area.

First off, the automotive sector is stronger. There is more of our -- there's more ADI content in cars these days. If you just look at the in-cabin electronics side of things. We focus on premium audio media, for example, so we have a long heritage in selling DSP technologies. We have a lot of mixed-signal electronics. We're now attaching power electronics from the LT franchise. On top of that, we have added our A2B franchise, which is a very thin, low-cost, high-fidelity bus system that is now shipping into more than 20 OEMs globally. And also on top of those 2 technologies, DSP, audio and the A2B, we now have active road noise cancellation technologies that we're shipping as well. So there's a lot more sensors, a lot more signal processing. So that's the in-cabin side of things.

Then if I look at the electric vehicle, that thing is growing fast. We have a very, very strong order book for these battery management solutions. We're on our fifth generation now. We have coverage from these wired battery management solutions to wireless. That's a new modality. And you probably saw recently the announcement that we did with GM, where they're basing the monitoring of their batteries, in their entire fleet with ADI technology. So when you consider that today, there's 2.5 million, 3 million electric vehicles sold a year, that's going to increase at least in order of magnitude between now and the end of the decade. So that's all yet to come in terms of growth. So I believe that the headwinds that we had have largely abated, and now we've got 2 or 3 strong tailwinds behind us in that particular business.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Let's talk about the BMS business a little bit. First of all, I guess, talk about a little bit of wireless versus wired solutions, like why is wireless better from your -- both in terms of functionality and then I guess, in terms of like your content, what kind of a premium are you getting on like a wireless solution versus a wired?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So there's going to be, at least for the foreseeable future, though, there will be 2 offerings, okay, or at least 2 streams of demand for our battery management products. The wired side requires -- it's the way batteries have traditionally been built where you use a wiring -- you use sensors with a wiring harness, you collect the data, you move it through a wiring harness to an aggregation point and then eventually to a central computing unit. What that means is that wiring harness decreases your flexibility. It's a fixed piece of metallic engineering so it's a fixed harness. It decreases the flexibility in the -- in how you configure the batteries. It's susceptible to corrosion and reliability issues.

On the wireless side, we've got this cognitive radio system that enables us to -- enables our customers to put sensors in very, very different configurations because they don't depend on the wiring harnessing, they have tremendous configurability flexibility. You don't suffer from the

natural reliability issues of the wiring harness because you're moving your data wirelessly. And what it means for ADI is that we get anywhere between kind of 50% and 100% more content value for the wireless system than we do for the wired one, wired harness system.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

How big is the BMS business today, by the way? Obviously, we're still at the dawn of the EV age.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. Well, it's getting up now into double digits of the company's automotive business. So it's becoming significant. And as I said, my expectation is we can grow that in the pretty high single digits, I think, for several years to come.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. And then we'll talk about Maxim in a little bit, but I mean, like Maxim obviously plays here as well. How does Maxim strength, and I guess, the -- talking about the rest, but the auto business in general and the BMS business, particularly because they also play in the space, correct?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes, they do. So Maxim has a strong business today in power management, in the car across multiple sub-applications within the car. They have a good franchise in these interconnectivity products, moving data around the car, high bandwidth data from applications like cameras, automatic cameras and so on and so forth. And yes, they have a battery management business, LT and Maxim are 2 of the very first providers of battery management systems for electric vehicles. So that today is a strong business for Maxim too. So I think it -- we get a bigger portfolio for the automobile, whether it's classical combustion engine, hybrid or electric vehicle. So it just makes the whole of ADI's business stronger and with a very, very strong design pipeline as well as R&D pipeline.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Who else do you see in that space, by the way when you guys are competing for sockets and BMS?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

There's a couple of other -- if you look at the other big mixed-signal providers in cars from Europe, and further South here -- further South from Boston here. It's the classical...

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

The usual suspects?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Usual suspects.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

All right. Got it. I do want to ask one question just on consumer, by the way, before we move. So I'm going to say -- I actually like how you sort of split things out. You have like B2B, auto industrial common and consumer and investors have kind of been trained to look at them separately, which I think is good. But consumer looks like it's bottomed now, and you've talked about a bottom like once the Apple business kind of went away and now poised for at least some growth. Can you talk about what is in that business today and when it says consumer, like what does that mean? Like what kind of end market does it expose? And why should it grow from the base where it is now?

Vincent T. Roche - *Analog Devices, Inc. - President, CEO & Director*

Yes. So there was one very large socket, one very large customer. You know that for 3 years or so, was accentuating towards 0. So we've got that tailwind -- we've got that headwind behind us now. So what is the remainder of consumer? So roughly half of our consumer business is what I would classify as enterprise level video and audio media systems. So office environments, hospital environments, et cetera, et cetera. So that is about half of the company's business. It actually feels a lot more like a classical B2B business. It's highly fragmented. It uses a vast amount of our portfolio. Hundreds of customers using thousands of different product SKUs, with long product life cycles.

The other half of our business is what we would call hearables and wearables. So about 40% of that remaining half in hearables and wearables is smartphones. So it's -- and then the rest is in literally vital signs monitoring systems for health applications, high quality in ear buds, music, media buds and so on and so forth with a lot of active noise cancellation. So that's the spread. It's a highly diversified B2B look alike in one place and classical high-performance signal processing in audio, video and hearable systems.

Stacy Aaron Rasgon - *Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst*

Got it. That's helpful. I want to switch over to some broader strategic questions. So I hold to a view in the analog space in general, I kind of feel like growth needs to be more important going forward than it was. And I can look at you and look at a lot of your peers. I mean, just the degree of financial improvement in terms of margin expansion, everything has been phenomenal. Again, I mean, you guys used to peak out in the high 50s, like once upon a time, if I go back 10, 10-plus years and I mean your trough margin is now probably 10 points higher than your -- than your peak margins used to be. Obviously, the addition of Linear added things more, but going forward, I mean, it's like -- it's unlikely you're going to see another like 1,000 basis points of margin expansion, which to me, means that growth probably needs to be a bigger piece of the rest of it. And to my eyes, you seem to have like embraced that view maybe a little more than some of your peers. Would you agree with that statement? Or do I have it wrong? And I guess, maybe like the shortest way, is ADI a growth company? Is that how you think ADI investors should be looking at ADI right now?

Vincent T. Roche - *Analog Devices, Inc. - President, CEO & Director*

Yes. So first and foremost, we are investing 19% or 20% of our revenue in R&D every year. And we do that because we expect innovation to drive profitable growth for the company for the long term across that big portfolio of applications that we address. So yes, I expect ADI to grow. And I believe that growth is the elixir. I mean with the business that we have, so diversified, some of our businesses get margins well above our average. So we've got a portfolio that we -- we're always tuning for profitable growth. I still believe that we have some -- we're always working on cost of goods. There's always an efficiency side of the equation as well to continue to maintain the profits and make ourselves more competitive in the market.

So yes. I think if I look at ADI, I think we should be growing at the rate. We're investing 5%, 7%, 8% a year. So that is our mission to grow this company profitably. The value creation engine for ADI is innovation. We like the play in the leading edge, get ahead of our customers' needs and be able to address all those rich applications and get leverage across the company.

Let me give you an example. If I look at the industrial portfolio, it today is largely what we would call precision signal processing, we get enormous leverage of that portfolio, the technology into our consumer business, which is largely precision signal processing as well. So it's a leverage game. But yes, I expect ADI to be able to put up growth every year based on the investments we're making.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. How do you think about the allocation of that like 20% a year of R&D? Like how much of that goes to like new products versus like sustaining existing ones? Like what does that split look like for you guys?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So really, there's a few different buckets. One would be making sure that we're investing to get access to the most important silicon process nodes, for example, okay, advanced packaging technologies. So that consumes less than 10% of the R&D pipe at ADI. We have, I would say, really, the remainder of the R&D goes into the new product development set of things. So 10-ish percent is advanced packaging, advanced process technology, probably engineering and total of ADI, 20% is sustaining, 10% into these advanced technologies and packages and the rest into product development. That's the way to think about it. So there's a little more than 20% across those 3 buckets, but the lion's share of what we spend is in new product development.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. How long does it take actually like once you're developing something to bring it to revenue? This is a multiyear process to actually see revenue, right?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

It pretty much depends on the market. The returns of investment in consumer are much, much faster from the time you develop a product until the time you -- it might take a year to develop a product. You can hit peak revenue within a year, 1.5 years after that. The industrial sector takes longer. The product development cycles are 1 to 2 years on average, I would say, and it can take 5 years, 7 years to start ramping towards peak.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. It sounds like you leveraged technology though for a consumer to help with those products, with those faster product cycles, too, though.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. And also it's a reinforcing cycle because we will get on to new nodes faster in consumer, for example, and then we use the technology platform we're building for a consumer in industrial applications as well because we're always looking to push to the highest level of performance, whether it's consumer or industrial. So it's a big leverage getting at ADI in terms of reusing technology.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. So I guess along those growth lines, I want to talk about the inorganic side as well. You, unlike some of your peers, have shown a great willingness to engage in M&A. And in many cases, transformational M&A, you haven't backed away. And so far, I would argue that it's worked pretty good.

I was wondering, first, could you talk about the prior sort of like more sizable acquisitions that you've done, Hittite and then more recently, Linear. In terms of like, how pleased are you or displeased in terms of the returns that you've gotten on those deals sitting at this point in time in terms of the synergies that you've achieved in terms of on the top line if there's any sort of a knowledge or color in terms of the top line acceleration growth from those. And just in general, the overall return on the assets from the purchase versus doing something else with the cash?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So we've acquired anything we've done in terms of acquisition has been about getting ahead of our customers' needs, really anticipating what they need 5 years out, 10 years out and building a franchise to be able to solve their burgeoning problems more completely. So we've always bought very high-quality engineering-centered assets. And if I go back and look at Hittite, that was a roughly \$270 million revenue stream when we acquired it. I think it was 6, maybe 7 years ago at this point in time. And we've more than doubled the size of Hittite in that period of time. That's a really high-quality, differentiated revenue stream based around orphan microwave technologies. And we've benefited greatly there in the area of aerospace and defense where Hittite had a very, very good franchise. We've been able to expand it and diversify it. And also it strengthened our communications and instrumentation offerings. If you look at a lot of the really high-frequency technologies that we've brought into electronic test equipment, for example, a lot of that is based on the Hittite technology. So I'm very, very pleased with that.

When I look at LTC, we are 4, almost 5 years beyond the closure of LT, and what I had said at the time, Stacy, you will remember, you have a very good memory, was that we would double their historical growth rate. And what we're seeing today is we're about double -- we've about doubled or maybe a little more than doubled their growth rate based on areas like battery management, in electric vehicles, these battery management systems. And also, we've been able to attach LT power to more and more places in automotive, in consumer.

So I've got to say, overall, I'm very, very pleased. And these -- remember, these franchises, they last in perpetuity. They're an annuity. So you've got to look at the value from a pure financial standpoint over a long period of time. So I think we're well positioned. We've been able to scale both of those franchises, particularly in terms of R&D, been able to put R&D into play and also attach them to a stronger, broader go-to-market effort. And we'll do the same thing, I expect with Maxim.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

So what does Maxim bring to the table? Like it sounds like you feel like it's more than just a simple scale play. Like what specifically does Maxim bring in terms of capability that you didn't already have? And how does it add to the story?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. Well, I think it brings a lot more power management. For example, so we'll have a \$2 billion-plus power management franchise. So it gives us the opportunity in -- when you think about it, our management is about half of the overall TAM in the sector. So we got more R&D. We get a bigger pipeline of products, particularly in the application-specific areas. LT had really pointed its power management capability at the broad market and the catalog opportunities. So we continue to play and strengthen that in the broad market, but Maxim largely brings a more application-specific focus. And that is a great complement, I think, to the LT portfolio. From a market perspective, I would say, Maxim has a good position in areas like data center and cloud.

And in parts of the automobile, as I've pointed out, they have a strong interconnectivity portfolio and a strong -- there's a strong EV play with our battery management technology as well as power management in general in multiple parts of the automobile. So I think they are the primary complement charges between the 2 portfolios of ADI and MAX.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Got it. And I guess when you bought Linear, you actually put out specific financial targets. When you bought Maxim, you did not -- it was more qualitative, although to be fair, I guess, we were in the middle of the pandemic, too. So maybe that was part of it. But I know the deal you've suggested is reasonably close to closure. You've talked about doing a call post deal to talk about capital return, and we'll talk about that piece in a minute, but are you planning on putting up more specific financial targets like post deal in terms of like what a long-term model and it's been a while that you did an Analyst Day. Is this something that we can expect?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

You can. I think my expectation is that we'll close the last part of the regulatory process by mid-summer, as we said in the year.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

And that's just China, right? That's all we're waiting for now?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Exactly. We're just going to China at this point in time. So June, July, expect we close. And there shortly after, we'll begin to elucidate everybody in terms of what we're thinking. The model is going to look like from a financial standpoint, including cash return, et cetera, et cetera.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. And I know you -- it sounded like people were a little surprised on the earnings call when you talked about this, but I mean, I think the plan has always been once you close Maxim to, because it is a stock deal that delevers you to bring leverage back to 1.5, give or take and then to return 100% of free cash flow going for. So that's not -- that's -- just to clarify for you, that has been the strategy since the day you announced Maxim, correct?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes, that's correct.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Okay.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

And actually, we will -- we take maybe liberty on some of the numbers, but yes, that is the policy of the company.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. I mean, ballpark, right? I mean, I'm not going to hold you to decimal points on the leverage point. Okay. That's helpful.

I have a question on some of the synergies. I know you've given the OpEx synergies. I know you said there's as of yet unspecified cost synergies because Maxim does have some manufacturing facilities that you'll figure out what to do with in due course specifically on the revenue side,

though, I know this was a piece of the Linear deal. Maxim historically has been somewhat growth challenged. And I know there were some issues there to the consumer business that was rolling off and everything.

But I guess, how should investors think about normalized growth for the Maxim asset? And what you may be able to do with it? Again, Linear, you talked about doubling the revenue. Do you see a significant opportunity in doubling the revenue growth rate. But do you see -- is there a significant like kind of future opportunity with Maxim, do you think, on the revenue side? Are there lessons that maybe learn from Linear that you can apply here?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. I think, Stacy, first and foremost, while Maxim has a very good portfolio of Analog and mixed-signal products, including power, they actually don't have a core franchise, a core leadership position in any one area. That's what ADI brings. We've got anchor franchises in areas like RF and Microwave, data converters, digital signal processing. So being able to connect the Maxim portfolio to ADI's anchors is going to be really, really important. I'll be a little up choose on the growth story, but you're quite right. They have been challenged largely because of a headwind in the consumer area.

But my sense, again, is that for the remainder of the portfolio, I expect to be able to double the growth over time of the rest of Maxim's portfolio. And I believe that the consumer portfolio will regulate before long. So yes, so I think the playbook that we've used for LTC and Hittite is the playbook for Maxim. Again, we use our heft, the heft of our portfolio, being the draw of our core franchises, the stronger go-to-market capability and the scale of what we have and make sure that we rationalize the R&D in place all the R&D dollars that we're spending in complementary places.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. And I guess the statement around capital return post deal does suggest that you're probably done or at least out of things that you could buy that would be more transformational, like? Is that an accurate statement?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Well, we're making sure that we keep our attention focused on getting Maxim closed, getting that integrated. So that is our priority. And then what I've said on the -- and what Prashanth will have said as well on the capital structure, the capital allocation of the company, you could infer that whatever we have after that will be given back to shareholders.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. Vince, we're almost -- we're up a couple of minutes off. I want to get to a few of the questions that are on the pigeon hole. Question is what do you see as the long-term growth rate for the analog semiconductor industry overall, if you have any?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

I think the industry, in general, depends on which parts you're playing. And if you're bring in the high performance, I believe it's reasonable to assume that 5% is the floor but parts we can grow to 10% over the long term. If you're in the commodity side of things, maybe a bit different, but I think the high-performance part of which we're at the center I think that's a 5% to 7% growth number for the longer term.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. And there's a question here on the channel. And so I mean, this probably comes from -- you have a large competitor that's been kind of disintermediating their distribution channel over the years. And the question is, do you see the role of distributors so the role that they play changing over time for the Analog industry, but maybe you could talk a little more broadly about how you view your own channel strategy and the nature of your relationships with your distributors? And do you see that changing at all?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Yes. So we have -- first off, we transact a lot of our business through our distribution channel. And when we acquired LTC, we focus that channel more clearly than we had in the past. So we have one very large global footprint. We have supplemented that big global footprint with strong regionally oriented distributors, particularly in Asia. I am happy with the configuration of our channel right now. And we're in a better place than we were, I would say, 5, 7 years ago before we acquired -- certainly since we've acquired LTC. And they're an important part of our go-to-market effort. So that's how I view the channel.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. We've got about 1 minute left. I'm going to give you your soapbox here. You've got a bunch of people on the line, somebody -- some may be familiar with ADI, and many of them may not be as familiar. Why should investors buy your stock?

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

I think, first and foremost, Stacy, semiconductors, as we've all seen, are the bedrock of the information age, and we play a very critical role as more and more of the digital technologies move towards the physical world, that's our space. We sit at that intersection between the world of the physical and the world of the digital.

So I've been in this business now I've been with ADI for more than 30 years, I've been in this semiconductor business, it was actually an intern at ADI, 40 years ago, but I am more enthusiastic about semis and about ADI's position in the world of semis than I have ever been. I think it is -- it's got a tremendous amount of legs, and I see the best years of semis ahead of us. And I think that is very true of ADI as well given the capabilities we've got today to really command our future across the plethora of applications I've talked about today.

Stacy Aaron Rasgon - Sanford C. Bernstein & Co., LLC., Research Division - Senior Analyst

Got it. I couldn't think of a better way to leave it. So we'll probably leave it there. Thank you so much for joining us. I really appreciate it. Thank you, everybody, on the line.

Vincent T. Roche - Analog Devices, Inc. - President, CEO & Director

Thanks, Stacy. Thanks, everybody. Bye-bye.

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